

CLAIMS

1 1. A follower apparatus for use in guiding material between the follower and a spool,
2 the follower comprising:

- 3 (a) a follower module including
 - 4 i) a base;
 - 5 ii) a roller rotatably attached to said base for guiding said material;
 - 6 iii) detection apparatus for detecting when said material is not in a
7 selected zone of said roller and for outputting a corresponding
8 indicative signal;
- 9 (b) motorized apparatus for moving said follower module; and
- 10 (c) control apparatus responsive to said signal for directing said motorized
11 apparatus to move said module into said selected zone.

1 2. An apparatus as recited in claim 1 wherein said module further includes a pulley
2 for receiving and redirecting said material from said roller.

1 3. An apparatus as recited in claim 2 wherein an axis of rotation of said pulley is
2 oriented parallel to an axis of rotation of said roller.

1 4. An apparatus as recited in claim 2 wherein an axis of rotation of said pulley is
2 oriented orthogonal to an axis of rotation of said roller.

1 5. An apparatus as recited in claim 1 wherein said detection apparatus includes a
2 light emitter and detector apparatus.

1 6. An apparatus as recited in claim 5 wherein said light emitter and detector
2 apparatus includes at least one first emitter and first detector for detecting said material in a first
3 side zone on one side of said selected zone and at least one second emitter and second detector
4 for detecting said material in a second side zone on an opposite side of said selected zone.

1 7. An apparatus as recited in claim 6 wherein each said detector is positioned to
2 detect light reflected from said material.

1 8. An apparatus as recited in claim 6 wherein each said detector is positioned to
2 detect a reduction in light from a corresponding said emitter caused by said material entering a
3 space between said emitter and said detector.

1 9. An apparatus as recited in claim 3 wherein said detection apparatus includes a
2 light emitter and detector apparatus.

1 10. An apparatus as recited in claim 9 wherein said light emitter and detector
2 apparatus includes at least one first emitter and first detector for detecting said material in a first
3 side zone on one side of said selected zone and at least one second emitter and second detector
4 for detecting said material in a second side zone on an opposite side of said selected zone.

1 11. An apparatus as recited in claim 10 wherein said first and second emitter and first
2 and second detector are positioned at an oblique angle to a plane defined by a direction of travel
3 of material between said roller and said pulley and a line passing through said material and lying
4 parallel to an axis of rotation of said roller.

1 12. An apparatus as recited in claim 11 wherein said first and second emitter are
2 positioned so as to direct a light beam at right angles to a direction of travel of said material.

1 13. An apparatus as recited in claim 3 wherein walls of said pulley are tapered so as to
2 avoid interference with said material.

1 14. An apparatus as recited in claim 2 wherein said pulley is rotatably mounted on a
2 support apparatus, and said support apparatus is rotatably mounted on a support axis lying in a
3 plane of the pulley and orthogonal to a direction of material passage from said roller to said
4 pulley, allowing said plane of said pulley to rotate about said support axis so as to maintain said
5 material substantially in said plane of said pulley as a direction of travel of said material changes.

1 15. An apparatus as recited in claim 14 wherein said detection apparatus includes an
2 encoder apparatus for detecting a value of an angle of rotation of said plane about said support
3 axis, wherein said value of said angle provides an indication of when said material is not in said
4 selected zone.

1 16. An apparatus as recited in claim 1 wherein said follower module includes first and
2 second physical stops positioned approximate first and second ends of said roller so as to prevent
3 said material from moving past said ends of said roller.

1 17. An apparatus for guiding material between a spool and a material guidance
2 module comprising:

- 3 (a) a spool module for rotatably mounting a spool;
- 4 (b) a material guide module including
 - 5 i) a base;
 - 6 ii) a roller rotatably attached to said base for guiding said material;
 - 7 iii) detection apparatus for detecting when said material is not in a
 - 8 selected zone of said roller and outputting a corresponding
 - 9 indicative signal;
- 10 (c) motorized apparatus for moving said spool module; and
- 11 (d) control apparatus responsive to said signal for moving said motorized
- 12 apparatus so as to move said spool module to position said material into
- 13 said selected zone.

1 18. An apparatus as recited in claim 17 wherein said material guide module further
2 includes a pulley for receiving and directing said material from said roller.

1 19. An apparatus as recited in claim 18 wherein an axis of rotation of said pulley is
2 oriented parallel to an axis of rotation of said roller.

1 20. An apparatus as recited in claim 18 wherein an axis of rotation of said pulley is
2 oriented orthogonal to an axis of rotation of said roller.

1 21. An apparatus as recited in claim 17 wherein said detection apparatus includes a
2 light emitter and detector apparatus.

1 22. An apparatus as recited in claim 21 wherein said light emitter and detector
2 apparatus includes at least one first emitter and first detector for detecting said material in a first
3 side zone on one side of said selected zone and at least one second emitter and second detector
4 for detecting said material in a second side zone on a opposite side of said selected zone.

1 23. An apparatus as recited in claim 1 wherein said motorized apparatus includes a
2 track, and wherein said base is configured to move on said track, and wherein said track is
3 oriented substantially parallel to an axis of rotation of said spool.

1 24. An apparatus as recited in claim 17 wherein said motorized apparatus includes a
2 track and said spool module is configured to move on said track, and wherein said track is
3 oriented substantially parallel to an axis of rotation of said roller.